

## Exhibit A

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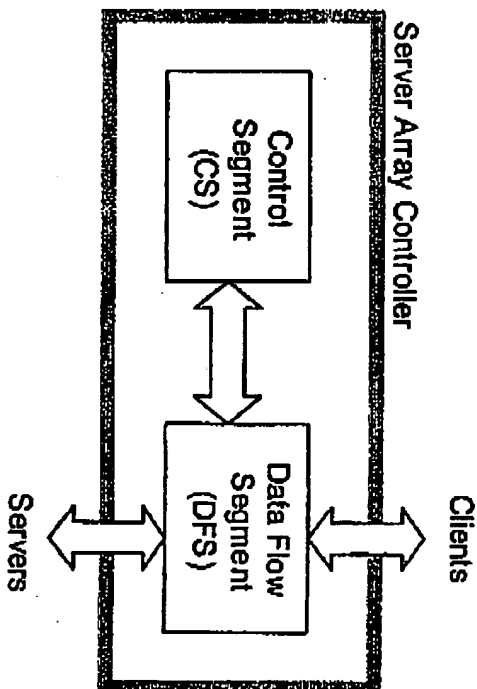
**BIG/flow**

Rob Gilde  
February 18, 1999



# BIG/flow Concept Of Operations

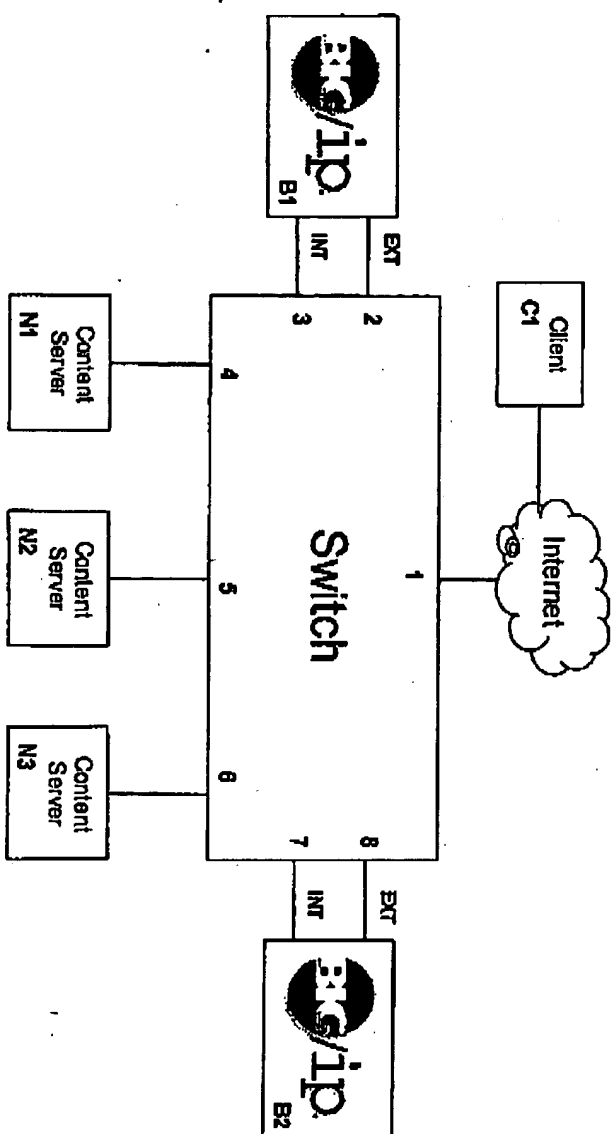
- DFS categorizes packets into flows
- DFS detects certain events for each flow
- For certain events, DFS sends a message to CS
- CS responds with a reply the describes translations and switching to perform on all packets in the flow

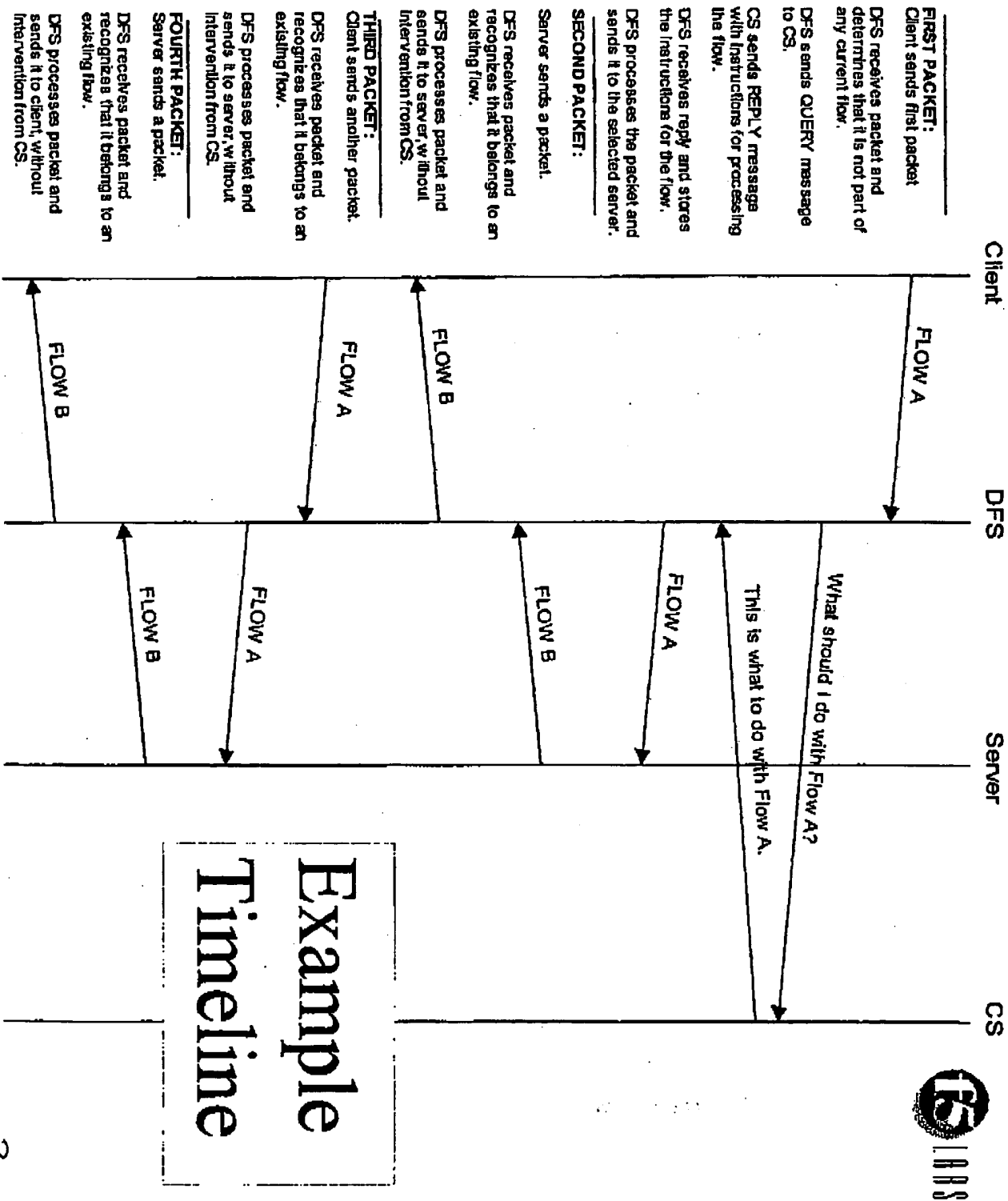


# Switch Integration Phases

## • Phase III: Full Two-Box Packet Processing

- Full capability
- No UI integration

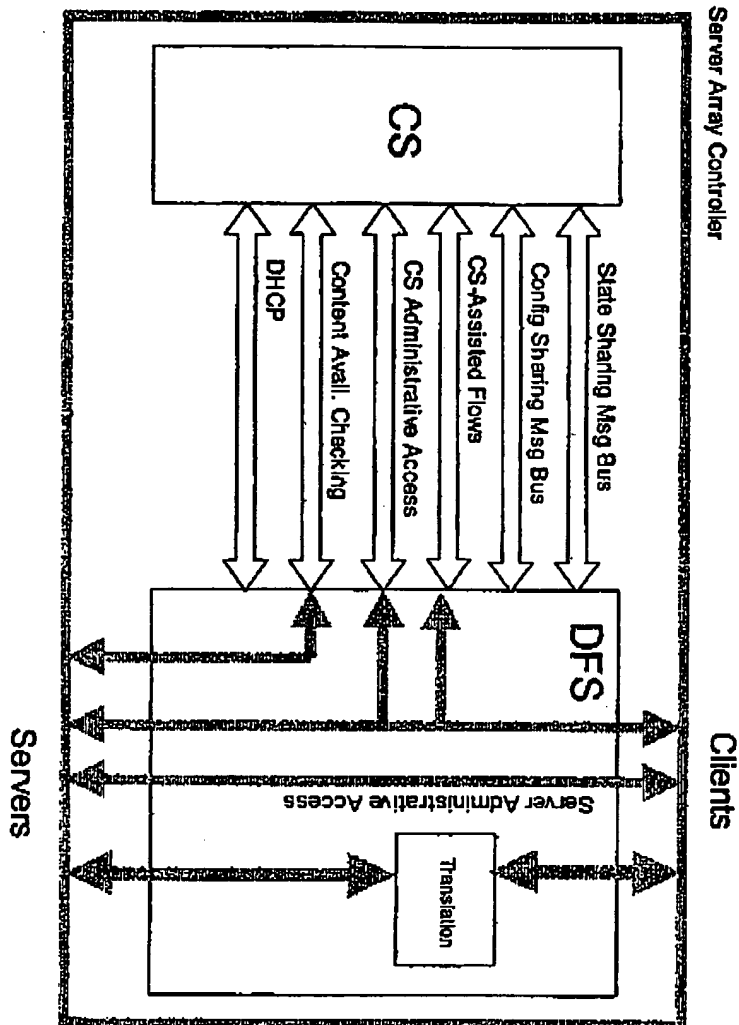




# Flows

	TCP Flows	UDP Flows
Start	When TCP connection-open is detected.	When a UDP packet is detected that does not belong to any existing UDP flow.
End	When TCP connection-close is detected or when the CS sends a message to the DFS indicating that the flow has ended.	When the CS sends a message to the DFS indicating that the flow has ended.

# CS $\Leftrightarrow$ DFS Interfaces



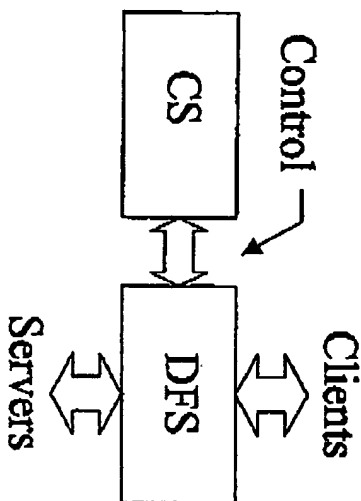
## CS Network Access

- Support administration of the CS
- Allow the CS to test devices connected to the DFS
- Allow certain flows to be directed through the CS for payload translation
- Allow the CS to generate ICMP packets

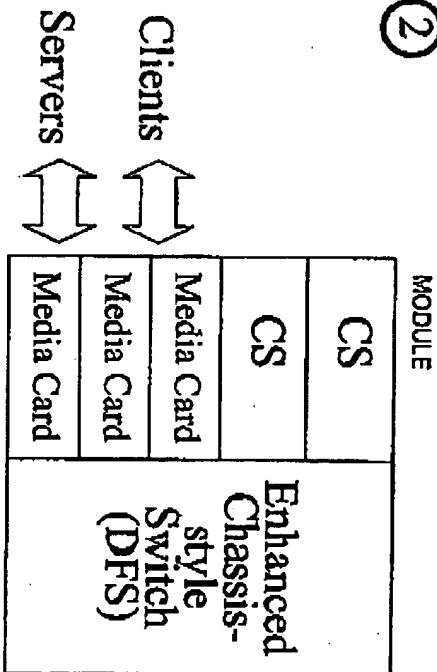
# Product Forms

## Switch-based

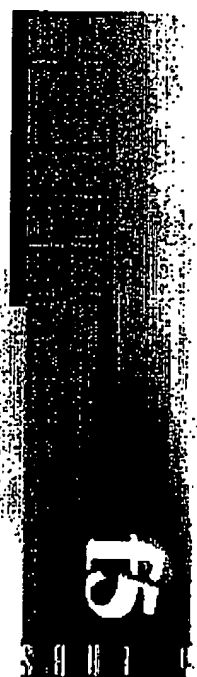
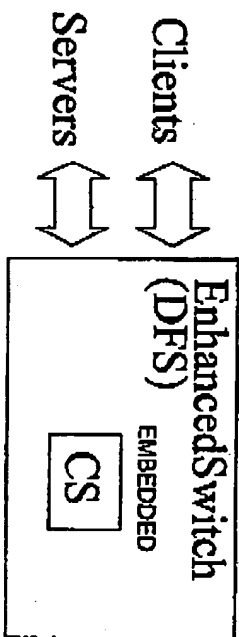
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# Switching

CS will select one of the following switch modes for each flow and notify DFS of it's choice:

- Select Port By Destination IP Address
  - similar to normal layer-3 switch function with the DFS acting as the routing engine
- Select Port By Next-Hop IP Address
  - similar to normal layer-3 switch function with the CS acting as the routing engine
- Send Packet To CS
  - when translation is too complex for the DFS to perform
  - when TCP Handshake Proxy is required

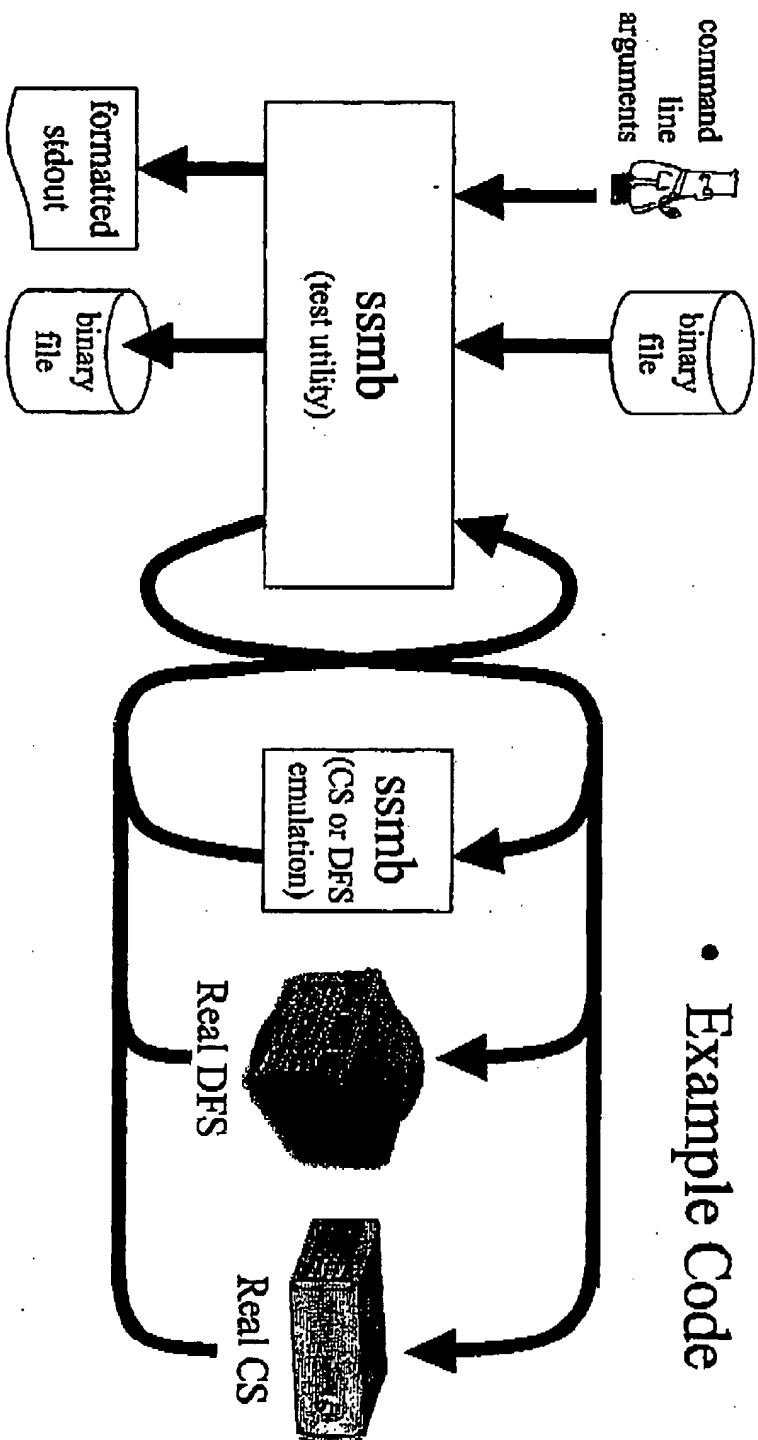
# Flow Lifetimes

Start	When QUERY is received from DFS
End	When DELETE is received from DFS or when reaped
Start	When QUERY is received from DFS
End	When timed out
Start	When first SYN is received or when NEWFLOW is received from CS
End	When both FINs are ACKed or when REAP is received from CS
Start	When UDP packet is received that does not match any existing UDP flow
End	When REAP is received from CS or when timed out

# Translations

- IP Header
  - Destination IP Address
  - Source IP Address
  - *Adjust checksum*
- TCP Header
  - Destination Port Number
  - Source Port Number
  - TCP Sequence Number
  - TCP Acknowledgment Number
  - *Adjust checksum*
- Payload (*depends on protocol*)

# SSMB Sample Implementation



- Debug/test utility
- Emulator
- Example Code

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